Organ Procurement 1999-2000: How is Hawaii Doing?

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Abstract

With the advent of The Final Rule, the state of Hawaii should have potential organ donor identification and referral rates of 100%. However, a retrospective chart review of 4,697 deaths in 1999 and 4,730 deaths in 2000, revealed identification rates of 80% and 84%, and referral rates of 53% and 71%, respectively. Proper recognition and referral of all potential donors is essential to bridging the enormous gap between the supply of organs and its demand.

Introduction

The number of organ donors nationally increases every year. In 1998, the OPTN (Organ Procurement and Transplantation Network)/Scientific Registry Data recorded 9,913 organ donors, a 68% rise from 5,905 donors 10 years prior. Over the same 10-year period, however, the waiting list has grown more than 300%, from 16,026 in 1988 to 65,005 in 1998.[1] The demand for organs still continues to exceed the supply, and the gap between supply and demand continues to widen. Of the more than 60,000 on the waiting list, 35,000 will remain waiting as their disease progresses, and ultimately 5,000 will die this year.[2]

Various attempts have been made to increase the donor pool. For example, public and professional education programs have been implemented to raise both awareness of the donation process and willingness to donate. Donor criteria have been expanded to include cadaveric donors of advanced age and those with coexisting illness who may have been excluded in the past.[3] Advances in medical technology have also allowed the use of non-heartbeating donors in certain situations (Non-heartbeating donors refer to individuals who have achieved cardiac death with cessation of circulation, as opposed to donors who have attained brain death, but cardiac function and circulation remain intact).[4] Furthermore, almost every state has passed "required request" laws, mandating that hospitals ask the next of kin of every potential organ donor for consent to donate. In 1986, the federal government followed with the Omnibus Reconciliation Act, which required hospitals to have set protocols ensuring that all families of potential donors are approached about the possibility of donation.[2] Despite these interventions, however, the growth in organ donation did not meet expectations. In fact, as many as one third of the families of medically suitable donors are never approached regarding organ donation,[5] and underutilization of potential donors has been documented in intensive care units, emergency departments, university teaching hospitals, and community hospitals nationwide.[3]

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On June 22, 1998, A Final Rule was issued by the Department of Health and Human Services (DHHS), effective August 21, 1998, mandating that hospitals notify organ procurement organizations (OPOs) of all deaths and imminent deaths if they wish to maintain eligibility for Medicare and Medicaid reimbursement.[1] The Rule was modeled after Pennsylvania's "routine notification" law, which substantially increased the state's organ donations. Specifically, organ donation by one Pennsylvania OPO increased by 40%, whereas the national increase in organ donation was only 7.7% for the same period.[2] Routinely notifying OPOs of all deaths and imminent deaths should effectively increase the hospital rates of identification of potential donors and subsequently increase the rates of referral of these potential donors to the OPO.

Methods

Organ Donor Center of Hawaii (ODCH) reviewed the medical records of all deaths that occurred in 1999 (N=4,697) and 2000 (N=4,730) at 17 major acute-care hospitals on the islands of Oahu, Maui, Kauai, and Hawaii to determine the number of medically suitable, potential organ donors in our local population.

For the purpose of the study, a potential organ donor was defined as a brain-dead patient, 70 years of age or younger, without evidence of HIV, cancer, or life-threatening transmissible disease at the time of death (Individual organ function of each patient, however, was not assessed).

The following medical records were therefore automatically excluded from the study:

1. Medical records of patients older than 70 years of age.
2. Medical records with documentation of the following ICD-9-CM codes:

(See Figure 1)

Figure 1.— ICD-9-CM Codes of Exclusionary Medical Conditions

010.00-018.99	Tuberculosis
042.0-044.99	HIV with specified conditions
046.1	Creutzfeldt-Jacob Disease
054.5	Herpetic Septicemia
070.2-071	Hepatitis B surface antigen and Rabies
079.5-079.59	All retrovirus infections
150.0-199.9	Malignant neoplasms, except primary CNS tumors & skin cancers
200-208	Hodgkin's Disease, Multiple Myeloma, Leukemia
230-239.9	Miscellaneous carcinomas
284.0-284.9	Aplastic anemia
288.0	Agranulocytosis
321.1-321.2	Fungal and Viral meningitis
323.0-323.4	Viral encephalitis
551.0-551.9	Gangrene of bowel
765.00-765.03	Extreme immaturity
795.8	Positive serological or viral culture findings for HIV

The medical records of the remaining deaths were reviewed. The individual charts were compared against the hospital's death printout and ODCH's records for completeness. Only those patients that had documentation of meeting brain death criteria without exclusionary conditions were considered medically suitable, potential organ donors.

The medical record reviewers were ODCH transplant coordinators (RNs) with experience in death record reviews using the Association of Organ Procurement Organizations (AOPO) Death Record Review forms (See Figure 2).

Data was summarized by age, race, cause of death, and mechanism of death. The following was then determined:

- *Identification rate* = # potential donors properly identified by hospital staff ÷ all potential donors
- *Referral rate* = # potential donors referred to ODCH ÷ all potential donors
- *Consent rate* = # consents signed for donation ÷ # families approached for consent

Results

Of the 4,697 deaths that occurred in the acute-care hospitals in Hawaii in 1999, 75 were determined to have been medically-suitable potential organ donors upon retrospective review. Among these 75 potential donors, the cause of death was of non-traumatic nature in 64% of the patients, with cerebrovascular accident/intracranial hemorrhage accounting for the main mechanism of death (Table I). 19% of the potential donors were under 35 years of age, whereas 59% were over the age of 50 (Table II).

Of 4,730 deaths in 2000, 79 patients were deemed potential organ donors. Similar to 1999, the cause of death was largely non-traumatic (75% of potential donors), with cerebrovascular accident/intracranial hemorrhage being the main mechanism of death (Table I). 23% of potential donors were under age 35 and 53% were over age 50 (Table II).

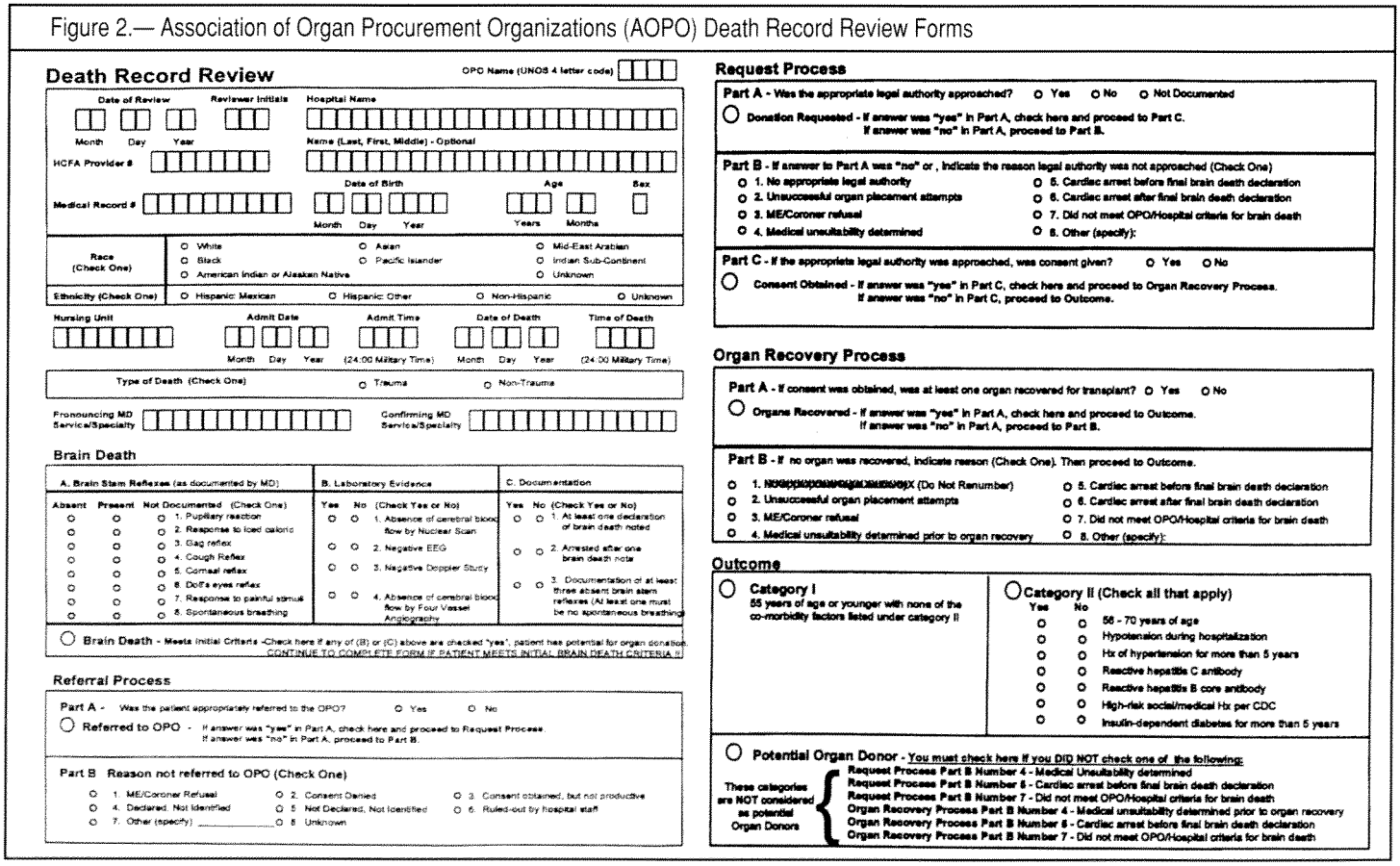
Of the 75 potential donors discovered upon retrospective chart review in 1999, only 60 were in fact identified by health care professionals as prospective donors at the time of death. In 1999, Hawaii's hospitals therefore had an overall identification rate of 80%. Furthermore, of the 75 potential donors, only 40 were referred to the Organ Donor Center of Hawaii, accounting for a referral rate of 53%. 28 of the 48 families who were approached (40 families approached by ODCH and 8 families by hospital staff) agreed to sign the consent for donation, yielding a consent rate of 58% (Table III).

In 2000, 66 of the 79 potential organ donors were properly identified, resulting in an identification rate of 84%. 56 of the potential donors were referred to ODCH, and 33 of the 64 total families approached (56 families approached by ODCH and 8 by hospital staff) consented to donation, yielding a referral rate of 71% and a consent rate of 52%, respectively (Table III).

Discussion

Traditionally, the ideal organ donor candidate has been a relatively young patient with irreversible brain injury sustained from a traumatic incident, with no coexisting medical illnesses and excellent multiorgan function.[2] As the demand for organs continues to exceed the supply, the criteria for medically suitable donors have expanded.

Figure 2.— Association of Organ Procurement Organizations (AOPO) Death Record Review Forms



Most notably, the percentage of donors over the age of 50 rises with each subsequent year. According to national data in 1998, donors in the 50-64 age group comprised 20% of all donors, an increase from 14% in 1990. Furthermore, donors aged 65 and older constituted 8.5% of all donors in 1998, compared to 2% in 1990. In contrast, donors in the 18-34 year old age group decreased from 38% in 1990 to 27% in 1998.[6] The expansion of the potential donor pool to include patients of more advanced age is also very evident in the state of Hawaii. In 1999, potential donors in the 51-65 and over 65 age groups comprised 35% and 24% of all potential donors, respectively. Moreover, in 1999, potential donors over the age of 50 composed 59% of all potential donors, which is three times greater than the percentage of potential donors under age 35. In 2000, potential donors over age 50 continued to comprise a substantial percentage of the total pool at 53% (See Table II).

The increase in the average age of donors may also be partly attributed to the increase in the proportion of donors who die from primary central nervous system events. Nationally, the percentage of donors who died from cerebrovascular accidents increased from 41% in 1994 to 44% in 1998, while donors who died from head trauma decreased from 49% in 1994 to 44% in 1998.[7] In general, individuals who die from cerebrovascular events tend to be older, while those who die from traumatic injuries tend to be younger. In Hawaii, potential donors who died from a cerebrovascular accident/intracranial hemorrhage (CVA/ICH) in 1999 constituted 64% of all potential donors, whereas those who died from traumatic injuries comprised only 36%. Similarly, in the year 2000, 66% died from CVA/ICH compared to 25% from trauma (Table I).

The age of the donor has significant implications for organ procurement since fewer organs are typically recovered from older donors. Thus, although the total donor pool may have increased, the average number of organs retrieved per donor most likely decreased. Organs procured from older donors may also have lower graft survival rates. One study demonstrated two-year survival rates for renal grafts from donors over age 55 to be 14% lower than survival rates for grafts obtained from donors aged 16-45.[8] Whether or not the risk of organ failure outweighs the risk of dying while on the waiting list, however, is uncertain. On the other hand, some studies have shown favorable outcomes with organs procured from older donors.[9-12]

Table 1.— Potential Organ Donor Cause and Mechanism of Death (1999 and 2000)

Category	Number		Percentage of Total	
	1999	2000	1999	2000
Potential organ donors	75	79	100%	100%
Cause of Death				
Medical/Non-Trauma	48	59	64%	75%
Trauma	27	20	36%	25%
Mechanism of Death				
CVA/ICH	48	52	64%	66%
Head Trauma	11	11	15%	14%
Anoxia	8	7	10%	9%
MVA	5	6	7%	7%
GSW	3	3	4%	4%

Perhaps the biggest barriers in organ donation today center around the three main stages of the organ donation process. These stages include: 1) Hospital identification of potential organ donors; 2) Hospital referral of potential organ donors to the OPO; and 3) Obtaining consent for organ donation by the patient's family. The issue of consent for organ donation is extremely complex. It involves a dynamic interaction between grieving family members, physicians, and OPO staff, and also depends upon variables such as the timing of the request, the patient's demographics, and the personal characteristics of the individual making the request. The issue of identification and referral, however, is more concrete. Many potential donors are lost simply because they are not identified and/or referred. It is estimated that as many as 27% of the medically suitable organ donors in the United States are not identified.[2] Various studies have shown that hospital staff consistently do not recognize many potential donors.[13-15] Low rates of identification can be attributed to several reasons. For example, hospital staff with a lack of knowledge of organ donor criteria may exclude potential candidates. Similarly, a lack of understanding of the concept of brain death and its determination may prevent the identification of many potential donors.[2] Low rates of referral to the OPO may simply be a reflection of the inability to recognize a potential donor. Unsatisfactory referral rates may also be attributed to an uncertainty as how to initiate the referral process. A reluctance to spend the extra time evaluating, documenting, and establishing contact with the OPO is cited as another possible reason for low rates of identification and referral.[2,3,16]

The Final Rule was designed to circumvent the aforementioned pitfalls of identification and referral. The stipulation of notifying the OPO of all deaths and imminent deaths, regardless of age or disease state, takes the responsibility of evaluation of potential donors away from the hospital staff and places it in the hands of specially trained OPO members.[2] Furthermore, prompt identification and referral of potential donors expedites the entire donation process, including actual organ retrieval. The timeliness of organ retrieval is essential since organ viability decreases quickly once brain death has oc-

Table 2.— Potential Organ Donor Demographics (1999 and 2000)

Category	Number		Percentage of Total	
	1999	2000	1999	2000
Potential organ donors	75	79	100%	100%
Age				
0-20	4	7	5%	9%
21-35	10	11	14%	14%
36-50	17	19	22%	24%
51-65	26	24	35%	30%
65-70	18	18	24%	23%
Ethnicity				
Japanese	23	22	31%	28%
Filipino	17	18	22%	23%
Caucasian	15	21	20%	26%
Hawaiian	10	8	13%	10%
Pacific Islander	4	2	5%	3%
Mixed/Other	3	3	4%	4%
Korean	2	1	3%	1%
Chinese	1	4	2%	5%

curred. Without aggressive support, cardiac arrest and end organ failure will ensue within approximately 6 hours of brain death for 20% of patients and within 24 hours for 50% of patients.[8] Thus, late notification of the OPO will not only delay the organ retrieval process but will also decrease the number of suitable organs available for transplant.

If followed diligently, the Final Rule implemented in 1998 should ideally result in statewide identification and referral rates of 100%. Yet, in 1999, the hospitals in Hawaii averaged an identification rate of only 80% and a referral rate of 53%. The year 2000 showed some improvement in the referral rate to 71%, but the identification rate only slightly increased to 84%. The 4% increase in the identification rate is discouraging, and although the rise in the referral rate to 71% is promising, it is still far from ideal.

Based on retrospective chart review of all patient deaths in 1999 and 2000, 28 potential donors were not identified, and among the 126 who were recognized, only 112 were actually approached. Using the national average consent rate of about 50% and the current rate of 3.21 organs recovered and transplanted per donor,[6] this data translates into approximately 67 lost organs.

Several studies have confirmed the efficacy of health care staff education and training in improving identification and referral rates.[3,5,16] In one study, the referral rate of an urban teaching emergency department rose from 30% to 100%, one year after intensive education of the ED personnel.[16] The educational campaign included a lecture about the current need for organs, the role of physicians and nurses in the donation process, the methodology of identifying potential donors, and the need for early referral and aggressive vital sign maintenance in potential donors. An OPO representative would visit the ED every 2 to 3 months and reeducate the staff. Facilities that emphasize the organ donation process and work closely with OPOs on a daily basis have been shown to outperform other hospitals in identification, request, and consent rates, as well as overall organ procurement.[16-17] Follow-up interventions are necessary, given that most educational programs have been documented as having a short duration of effect.[18-21]

Table 3.— Hawaii's Rates of Identification, Referral, and Consent (1999 and 2000)

Process Variable	Number		Rate	
	1999	2000	1999	2000
Identification				
Potential Donors Identified	60	66		
Total Potential Donors	75	79		
Identification Rate			80%	83%
Referral				
Potential Donors Referred	40	56		
Total Potential Donors	75	79		
Referral Rate			53%	70%
Consent				
Potential Donor Family Approached	48	64		
Consent for Donation Given	28	33		
Consent Rate			58%	52%

Conclusion

Although Hawaii's organ donation rates have increased over the years, there is still much room for improvement. In order to substantially increase organ donation, hospitals, OPOs, policy makers, and the general public must develop close, positive, and responsive relationships. Proper recognition and prompt referral of all potential organ donors are essential to bridging the gap between the supply of organs and its need. Each hospital must determine the most effective method for referring all imminent deaths to the ODCH. Ultimately, better awareness of the Final Rule and a greater appreciation of its implications will be necessary for its full effect to be realized.

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